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*****************************************************
*                                                   *
*                  AZIMUTH SIGNALS                  *
*                                                   *
*                 How they are written              *
*                         and                       *
*        what should be seen when they are read.    *
*                                                   *
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AZIMUTH SIGNALS ON ALIGNMENT DISKETTES

Due to the many different types of disk drives and drive alignment diskettes, it is becoming confusing as to what azimuth signal is correct. The following explaination should help you in understanding the different signals you are seeing on the scope, and which ones are acceptable azimuth readings.

To successfuly explain which signals are correct you must first understand how the azimuth pattern is written on the alignment diskette. There are several different azimuth burst patterns. The most common are 12 minute, 15 minute, and 18 minute (1 minute = 1/60 degree) bursts. The only difference between these burst patterns is the angle at which they are written on the diskette. Refering to Figure 1 and Figure 2 you can see how the pattern is written. Figure 1 shows the burst pattern. It starts out with an Index Burst and then the four azimuth bursts. However, the azimuth bursts are written to the diskette at different angles in relation to a radial line passing through the track (refer to Figure 2). The exact angles depends on the type of burst 12, 15, or 18 minute. For example with a 12 minute azimuth burst group, burst 1 is written at a 48 minute angle clockwise, burst 2 at a 24 minute angle counter-clockwise, burst 3 at a 24 minute angle clockwise, and burst 4 at a 48 minute angle counter-clockwise. The result of this form of writing bursts allows us to check the relation between the Read/Write Head azimuth and the media by the different amplitudes of the signal read.

To simplify the explaination of the azimuth signals seen on the scope, we'll use a planar view of the burst pattern on the diskette. With the burst pattern of Figure 1 we'll take burst 1 and move it 48 minutes clockwise from center (refer to Figure 3). Then moving the rest of the bursts accordingly for a 12 minute burst pattern, burst 2 is 24 minutes CCW, burst 3 is 24 minutes CW, and burst 4 is 48 minutes CCW, we arrive at Figure 3. Again this is not truly accurate but it's simplified for a graphic description.

We can now look at Figure 4 and see an ideal 0 degree azimuth reading. We start off with the burst pattern from Figure 3. Then we'll show the Read/Write Head and its readable area. Again, this explanation is an ideal situation and greatly simplified. The shaded area of Figure 4 shows the area of the bursts that are read by the Read/Write Head. Transfering that area to a scope pattern you can see a zero degree azimuth head error as shown in Figure 5.

The current drive specification for a Shugart, CDC, and TPI allows a +/- 12 minute head azimuth error. Let's look at what a "worst case" azimuth would look like. Refering to Figure 6, again we have the starting azimuth burst pattern on the same reference as Figure 4 which is the ideal head azimuth. However now we are going to tilt the Read/Write Head at an angle to depict an azimuth change. The shaded areas of Figure 6 now show the parts of the burst group that was read by the Read/Write Head. Transfering this pattern to the scope we can see the maximum positive angle allowable (Figure 7). The maximum negative angle would be just the opposite of Figure 7, having burst 1 and 2 equal, burst 3 large and burst 4 small.

Tandon drives are currently the only exception to the 12 minute error specification. Tandon allows a +/- 18 minute azimuth error. This can cause some confusion as to what is allowable for an azimuth signal. Figure 8 and 9 again shows the 12 minute azimuth burst only this time with the head at an +18 minute azimuth error.

Currently all of our alignment diskettes use a 12 minute azimuth burst group. If however you were to use a diskette with an 18 minute burst group, then Figure 7 would be the pattern for the maximum allowable angle for the Tandon drives.

Figure 7 is the "worst case" allowable azimuth signal for the Shugart, CDC, and TPI drives with a 12 minute azimuth burst group.

Figure 9 is the "worst case" allowable azimuth signal for the Tandon drive with a 12 minute azimuth burst group.

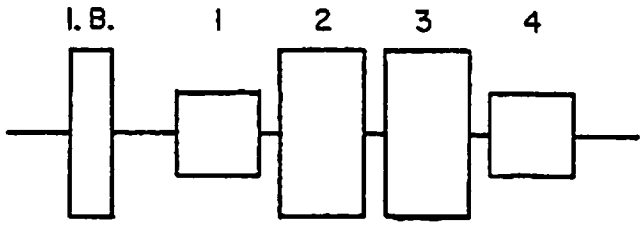

FIGURE 1

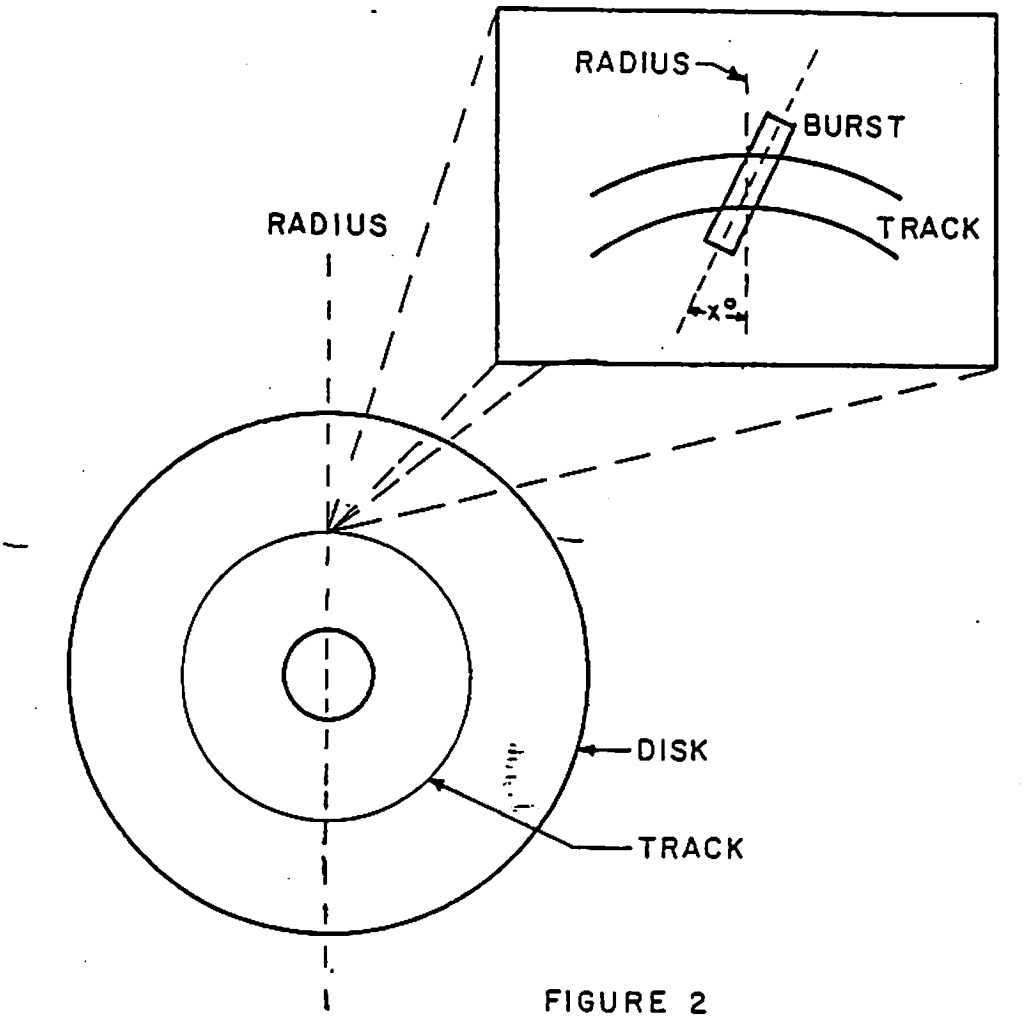

FIGURE 2

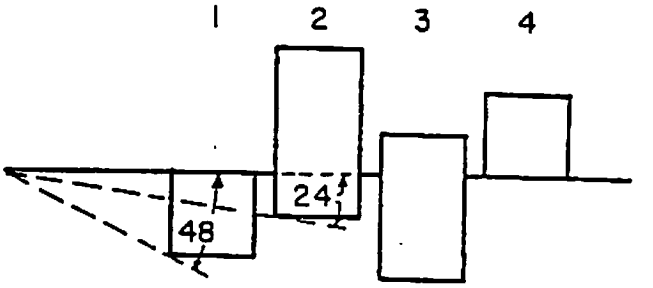

FIGURE 3

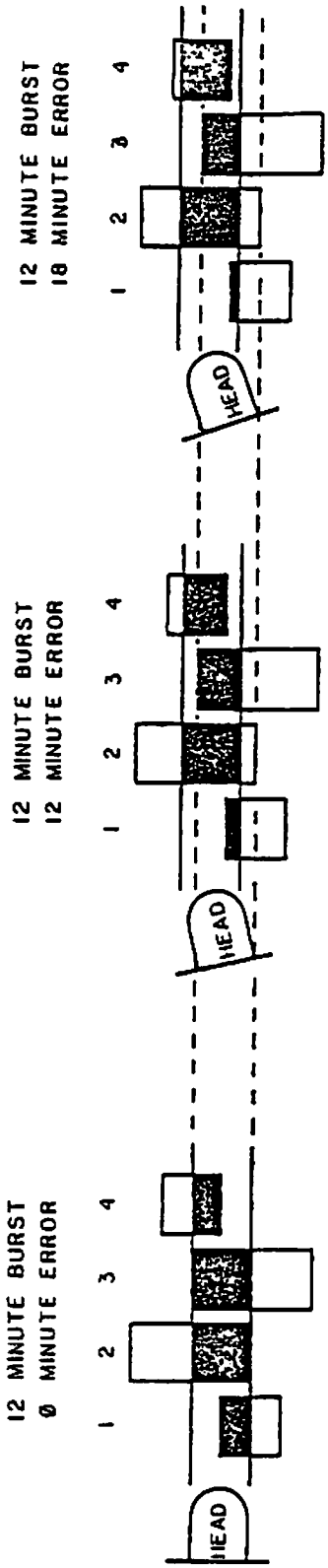

FIGURE 4

FIGURE 6

FIGURE 8

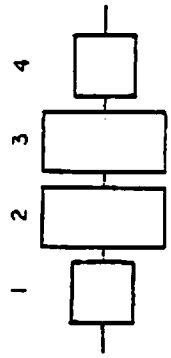

FIGURE 5

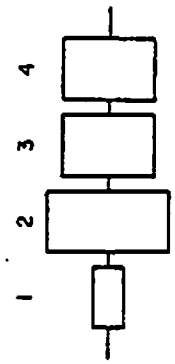

FIGURE 7

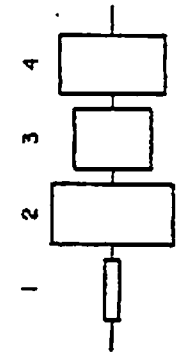

FIGURE 9